TESTIMONY OF

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BEFORE

THE SUBCOMMITTEE ON AVIATION OF THE TRANSPORTATION AND INFRASTRUCTURE COMMITTEE

U.S. HOUSE OF REPRESENTATIVES

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Thank you, Chairman Costello and Ranking member Petri for giving us the opportunity to testify today. My name is Candace Kolander and I am the Air Safety, Health and Security Coordinator for the Association of Flight Attendants – CWA (AFA-CWA) and served as a flight attendant at Aloha Airlines for 21 years. AFA-CWA is the world's largest flight attendant union, representing over 55,000 flight attendants at 20 airlines. I especially want to thank the Committee for giving our members from US Airways Flight 1549 the opportunity to tell their story today. I know that you are all as proud of them as we are. They are a true testament to the strength and resilience of all flight attendants that love this profession and take seriously our role as aviation safety professionals.

While they, and those flight attendants onboard Continental Airlines Flight 1404 last December, and hundreds of other flight attendants over the years have performed their primary safety responsibilities in emergency situations admirably, we are sadly reminded from the recent Continental Connection Flight 3407 accident in Buffalo operated by Colgan Air that our chosen career does pose a daily risk. Our thoughts and prayers over the last week have been with our colleagues at Colgan and all their friends and families that mourn the loss of two of our flight attendant family – Matilda Quintero and Donna Prisco.

The evacuation of Flight 1549 reminded everyone around the world in stunning fashion, just exactly what the role and purpose of flight attendants are – inflight safety professionals. Years of cultural attitudes have often relegated flight attendants to nothing more than "servers in the sky" in the eyes of some. In fact, airline management itself often seems intent on pushing this attitude further by adding more and more "customer service" type training for flight attendants, often at the neglect of important safety and security training. But the whole world has been reminded once again, through the actions of the three flight attendants you just heard from, of the importance of the true job responsibilities of flight attendants – to protect the aircraft's passengers and ensure their safety.

This is an important fact that Congress itself recognized in the last FAA Reauthorization legislation – Vision 100, when you required that flight attendants be certified as safety professionals. Until this Committee ensured that we would be certified for completing our safety training programs, everyone from the parachute packers to the pilots received certification after completion of their training, except for flight attendants. The certification that you required through Vision 100 was an important step in recognizing the professional safety role that flight attendants serve. We will forever be grateful to Congress for taking action on this long plight for professional respect.

Recently, we secured another important milestone in our efforts to formally recognize flight attendants as vital safety professionals when the Department of Labor (DOL) responded to AFA-CWA's formal comments and reclassified the flight attendant occupation to its rightful place. The DOL's Bureau of Labor Statistics maintains a Standard Occupation Classification (SOC) system in which every occupation is assigned to a certain category. Flight attendants had been listed in the personal care providers' category, along with professionals such as animal trainers, hairdressers, funeral attendants and fitness trainers. AFA-CWA has long disagreed with this classification and has worked to reclassify our profession with our fellow crew members and transportation workers. For the first time in over 30 years, flight attendants will now be listed with essential transportation workers such as pilots and air traffic controllers in the Transportation and Material Moving Occupation section.

The SOC is frequently used by government agencies when compiling and comparing employment data. AFA-CWA made the claim to the Department of Labor to re-evaluate the flight attendant classification after first securing flight attendant certification with the FAA thanks to the actions of Congress. This AFA-CWA victory in raising the profile of flight attendants is yet another step in the evolution of our profession to gain recognition from all levels of government and the public as safety professionals.

As the only safety professionals required in the cabin on passenger aircraft, we know that we provide a unique perspective on steps that have been taken to improve aviation safety

over the years and can give insight on important steps that still must be taken. For decades, AFA-CWA has been at the forefront calling for, and helping develop, improvements that have been made to ensure that our workplace – the passenger aircraft cabin – is as safe as it can be. We have been requested to appear before this Committee and others on a range of aviation safety issues many times, going back several decades. Besides the advice and expertise we have been called upon to provide to Congress, AFA-CWA has been an integral part of accident investigations going back to the mid 1950's and AFA-CWA has played a key role in developing the recommendations from those investigations. Congress and the National Transportation Safety Board have all recognized something that Iris Peterson, the first female flight attendant to take part in an accident scene investigation told me, "It is, after all, an advantage to everyone to have a flight attendant participate in an investigation because no one knows the aircraft cabin better than a flight attendant."

Some of our recommendations throughout the years have been implemented either through legislative action or changes at the FAA. Some have taken longer than we had hoped or not been as thorough. And many more are still in need of being addressed. As aviation safety professionals, that always have the safety of our passengers in the forefront of our minds, we remain committed to diligently and persistently doing everything we can to ensure that all necessary steps are taken to improve survivability in an emergency situation.

As the recent fatal crash in Buffalo reminds us, we need to remain forever vigilant in efforts to improve survivability and overall safety. We are fortunate that the accident rate has decreased and have seen overall survivability in airline incidents increase. But that does not mean that we should stop trying to make design or operational changes to improve safety or become complacent with the current record.

Specifically in the area of improvements that have benefited overall safety, we have seen a number of changes in design standards that we believe have been important steps towards improving survivability and decreasing injuries. AFA-CWA has been a vocal

proponent of these improvements. Among them are less flammable cabin material, requirements for floor level exit lights and requirements for 16g seats in all newly manufactured aircraft after October 2009.

Flammability Standards

There has been a great deal of attention given to regulations that govern fire safety. Fire onboard the aircraft during flight can have devastating consequences as we have seen in accidents like Swissair Flight 111 which crashed into the Atlantic Ocean southwest of Halifax International Airport on September 2, 1998. The accident investigation found that an inflight fire involving faulty wiring and flammable material used in the aircraft's structure propagated the fire to spread beyond the control of the crew. The spreading fire degraded aircraft systems and eventually led to a loss of control of the aircraft and the loss of 215 passengers and 14 crew.

Fire on the ground can be just as deadly particularly if it occurs as a result of a take-off or landing accident. Structural damage can occur to the fuselage or to the engines resulting in a post-crash external fuel-fed fire. Assume that the fire is about to enter the cabin and you have less than 90 seconds to get out of the aircraft. One of the key factors to your survival is the performance of the flight attendants in assessing outside conditions, initiating an evacuation, opening the exits and deploying slides, assisting passengers out of the aircraft, and dealing with the many unpredictable events of the crash. The other key factor in your survival in a fire situation onboard an aircraft is reducing the speed at which interior materials burn and reducing smoke and toxic gas.

A 1985 Notice of Proposed Rulemaking (NPRM No. 85-10) issued by the FAA hoped to enhance survivability of occupants by upgrading the flammability standards for materials used in the interiors of transport category airplanes as well as a testing method and apparatus to be used to show compliance with the new design standards. The improved flammability standard specified that interior ceiling and wall panels (other than lighting lenses), partitions, and the outer surfaces of galleys, large cabinets and stowage compartments (other than under seat stowage compartments and compartments for

stowing small items such as magazines and maps) must meet the new standards. The standard specified maximum heat release rates, and smoke testing provisions as well as addressing burn properties such as how quickly an image ignites. The standard was for airplanes type certificated after 1985, and required that cabin interiors of current use aircraft at the time, would not need to comply with the new criteria until the first replacement of the cabin interior.

On February 1, 1991, USAir Flight 1493, a Boeing 737-300, was landing at the Los Angeles International Airport at the same time Skywest flight 5569, a Fairchild Metroliner, was waiting on the same runway for takeoff. Both airplanes were destroyed due to the collision. All 10 passengers and 2 crewmembers aboard the Metroliner and 20 passengers and 2 crewmembers aboard the USAir airplane were killed. The NTSB accident report notes that many "passengers stated that the cabin filled with thick black smoke within seconds of the impact…" The report notes that passengers perished in the aisle possible waiting to exit through the row 10 exits. "They perished as a result of smoke and particulate inhalation, strongly suggesting that they were able to make their way, possible guided by the floor path emergency lights, to the overwing area from as far away as the forward cabin." (NTSB/AAR-91/08, page 65)

The Boeing accident aircraft was manufactured before the effective date of the flammability standard requirement for materials used in the interior of the aircraft and therefore any retrofit of fire retardant cabin furnishings was only required in the event of a general retrofit of the interior at a later time.

In addition to the focus on flammability of interior materials, other fire safety improvements implemented in the 1990s were geared to improving the survivability in a fire situation. On May 16, 1991 the FAA required that transport category airplanes have:

> (1) Each lavatory in an airplane with a passenger seating capacity of 20 or more to be equipped with a smoke detector system that provides a warning to the cockpit or to the passenger cabin crew;

(2) each lavatory trash receptacle in an airplane with a seating capacity of 20 or more to be equipped with a fire extinguisher that discharges automatically upon the occurrence of a fire within the receptacle;
(3) the number of hand fires extinguishers in the cabins of airplanes with passenger seating capacities greater than 200 to be increased;
(4) a specified number of the hand fire extinguishers in the cabin to contain Halon 1211 or equivalent as the extinguishing agent; and
(5) one hand fire extinguisher in each galley that is located above or below the passenger compartment.

Emergency Floor Lighting Systems

Another improvement made to enhance emergency evacuation is the requirement that aircraft be equipped with floor proximity emergency escape path marking. As mentioned above, fire and smoke in the aircraft cabin can have a devastating effect. Getting to an emergency exit as quickly and as safely as possible is a key factor in surviving an aircraft crash. To assist in finding emergency exits passengers would follow the verbal commands from flight attendants and the visual cues from emergency lighting systems as directional aids. Emergency lighting had been required on the aircraft for many years but the source of this emergency illumination was typically from overhead lights. In 1984 a new requirement was added that established a floor proximity emergency escape path marking to provide visual guidance for emergency cabin evacuation when all sources of cabin lighting more than 4 feet about the aisle floor are totally obscured by smoke. This new design requirement was in addition to the older emergency lighting standards. The floor level lighting was designed to improve safety in an evacuation.

16g Seats

Another critical factor in aviation safety in addition to the less flammable cabin interiors and the emergency egress lighting systems is the design of seats. The effort to improve the aircraft seat began as a requirement under Senator Metzenbaum's amendment to the Airport and Airway Safety Act and Capacity Expansion Act of 1987. That requirement forced the DOT/FAA to "initiate rulemaking proceeding to consider all seats on board all

air carrier aircraft to meet improved crashworthiness standards based upon the best available testing standards for crashworthiness" within 120 days after the date of the enactment of the Act on December 30, 1987. In its Notice of Proposed Rulemaking No. 88-8, issued in May, 1988, the FAA stated that it was continuing, "with renewed vigor," the effort to provide for the retrofit of improved seats in the air transportation fleet. Notice 88-8 proposed to prohibit the operation of transport category airplanes after June 16, 1995 unless all seats onboard met the new certification standards. The proposed upgraded certification standards would require a more sophisticated and complex testing of a 16g seat. The 16g seat was tested under a process called dynamic testing and was an improved process over the older 9g seats which relied on static pull tests for their certification. A 16g seat basically means that it is designed to absorb crash forces equivalent to 16 times the force of gravity and stay in place. The standard was designed to improve occupant protection in impact-survivable accidents.

From 1988 to the mid-to-late 1990s the FAA collected public comments, held industry meetings, working group meetings and held a public meeting to further discuss this important safety improvement. The industry argued that more information was needed to determine the impact of this proposed new rule. The 1988 proposed rulemaking was never closed while the FAA considered what do to next on the safety issue.

One of the industry arguments we heard at the time claimed that an accident prevention program somehow lessens the importance of providing state-of-the-art crash injury protection to the public. "Prevention" has long been accepted as the preferred option to "participation" in any hazardous event. But, concurrent with that philosophy is the practical recognition that "preparation" for participation in the hazardous event is ultimately necessary for those instances where "prevention" fails. Numerous examples come to mind. The State Department works to prevent war, but the Defense Department must be prepared to fight and win if prevention fails. Improved sanitation, personal hygiene, and good health practices are developed to prevent illness, but we work to assure the availability of the best available medical practitioners and medicines for those all-too-common instances when those prevention methods fail. Installation of the "16g"

seats in all transport airplanes is an essential element of preparation for the crash that can result when accident prevention fails.

In 1998, ten years after the FAA proposed but never issued a rule to require installation of 16g seats on existing aircraft types, the docket on Notice 88-8 for 16g seats was reopened for public comment. Subsequently on October 4, 2002 the FAA published a supplemental notice of proposed rulemaking (SNPRM) that again would require 16g passenger seats onboard certain manufactured aircraft. This SNPRM also included the requirement that flight attendant seats meet the 16g design standards. AFA-CWA welcomed this addition to the SNPRM as our workplace seats were not included in the original proposals for improved seat safety. This SNPRM also required that on or after 14 years after the effective date of the final rule that all transport category aircraft had to have passenger and flight attendant seats that complied with the new requirements. This was known as the retrofit requirement.

Above is just a highlight of some of the requirements in the 2002 SNPRM, there were others. Some of these requirements changed when the "final" rule on 16g seats was published. The FAA issued the final rule on "Improved Seats in air Carrier Transport Category Airplanes" on September 27, 2005. The final rule required passenger and flight attendant seats to meet the improved crashworthiness standards, 16g seats for those airplanes type-certificated after January 1, 1958 which have not yet been manufactured. Newer aircraft that have a type design basis after 1988, such as the Boeing 777 and the Boeing 787, would not be affected by this rule because they were designed to meet the revised emergency landing conditions which included dynamic landing conditions.

The implementation of this cabin occupant safety improvement has been sluggish to say the least and fraught with procrastination at many levels. We welcome the fact that transport category airplanes manufactured on and after October 27, 2009 when used in part 121 passenger carrying operations must comply with the rule for improved seat crashworthiness and occupant safety.

Exit Row Seating

One of the important rules to have been implemented by the FAA that has led to greater odds of survivability is the one regarding exit row seating. In 1990, the FAA issued a final rule listing requirements for passengers allowed to sit in the emergency exit rows. It required that an airline can only allow passengers able to perform the required safety functions in an emergency situation to sit in those seats. Those functions identified as important were:

1) A passenger must be able to locate the emergency exit door and quickly follow the instructions, written and oral, for its use. Door operations and instructions differ from aircraft to aircraft. A delay in figuring out how to operate the door can cost precious seconds; operating it improperly can injure or result in the death of passengers.
2) A passenger must be able to physically open the door. Doors are often heavy and clumsy to manipulate, and not every passenger can open them quickly.
3) A passenger must be able to determine when to open the door. This involves being able to respond to shouted or hand-signaled instructions from flight attendants, as well as being able to tell when opening an exit would be too dangerous.
4) A passenger must be able to go quickly through the open exit, in order not to cause a traffic jam at the door, and perhaps to assist other passengers to leave the danger zone around the aircraft.
5) A passenger must devote full attention to his or her emergency task. A passenger who must care for small children, for example, may be unable to do so.

Anyone flying and seated in an exit row is no doubt familiar with these requirements and the briefing required by flight attendants to those seated in those exit rows. Among them is an assessment that the passenger must be physically capable to open and remove the emergency exit door, that they must be over the age of 15 and that they must be able to read and understand the instructions regarding evacuation procedures and understand commands in the English language.

These requirements were important in increasing the overall odds of survivability as they improve the likelihood of ensuring that anyone occupying the seats at these emergency exits will be able to help effectively in an evacuation. Flight attendants cannot be at all emergency exit doors. In most emergency situations, the speed of evacuating an aircraft is critical. Mere seconds can be the difference between life and death. By ensuring that those occupying these seats are capable to quickly and efficiently open the exit doors and assist in a quick evacuation is an important improvement in maximizing passengers' chances of getting off an aircraft alive.

Crew Resource Management (CRM)

The aviation community has readily accepted that Crew Resource Management (CRM) concepts and training can lead to improvements in aviation safety. With CRM's emphasis on communications and teamwork, pilots and flight attendants are better equipped to work together to improve safety, security and passenger service. However, as with any management system, we must always be wary of complacency, and continuously evaluate our CRM programs to ensure that goals are met as the marketplace evolves.

For example, some of the new security measures that have been adopted in commercial aviation post-September 11, 2001 compel a re-examination of the communication methods integral to CRM. One specific area is in relation to the installation of the new reinforced flight deck door and its associated procedures. At some airlines, the locked door is hindering the traditional forms of communication that have existed between the flight deck crew and the flight attendants. The strides that have been made in the past relative to ensuring the "team" mentality between the flight deck and cabin crew are in jeopardy of being lost if we don't proactively look at the issue. In order to evaluate the effects of the locked flight deck door, we need to review the history of Crew Resource Management in aviation.

The first courses in CRM were in “cockpit” resource management. Early accident trends were on the rise until around the 1960s when we then saw the accident rates leveling off from the 1970’s onward. Part of the accident decline was attributed to better equipment and better training on the technical aspects of flying. These two things were not enough though, as crew-related actions such as poor decision making, ineffective communication and inadequate leadership and task management were contributing factors in 60 to 80 percent of accidents and incidents, according to the U.S. Federal Aviation Administration’s (FAA) Advisory Circular (AC) 120-51E. Therefore, in the mid-1980s, we saw “Cockpit” Resource Management training adopted at some airlines.

Eventually deficient crew communications from the cabin to the flight deck were cited as contributing factors in accidents and incidents. One example was the March 1989 Air Ontario Fokker F-28 which crashed on takeoff in Dryden, Ontario, resulting in 24 fatalities. The accident investigation found that the flight attendants did not tell the pilots that there was wet snow building up on the wing. The flight attendant had been reluctant to report, because in the past when she had related safety concerns to pilots, they did not welcome the information. She also assumed that the pilots were aware of exactly what was happening and that she should not second guess that they had all the information.

A similar failure of the cabin crew to communicate safety information was also evident in the January 1989 British Midlands Boeing 737 accident. During the take-off roll a fan blade fractured the No 1 engine (left). The pilots, however, thought that the No 2 engine (right) had been damaged. The flight attendants and passengers could see fire on the left engine but the pilots were never informed. The error went uncorrected and the only good engine was subsequently shut down. Forty-seven of the 126 occupants died.

One of the primary focuses of CRM is effective team coordination. Flight attendants offer an important information resource; thereby expanding the eyes and ears of the pilots. The more the two crew components act as a team, the more likely that passengers will have a better experience and safety of flight will be enhanced. The two examples above clearly showed that the “team” philosophy had broken down. Eventually, “Cockpit”

Resource Management expanded into the cabin and other operational areas, so that it is now appropriately termed Crew Resource Management. CRM now incorporates the entire flight operations team, including the pilots, flight attendants, dispatchers, air traffic controllers, maintenance and others.

Two Cultural and Geographical Environments

CRM training makes a major contribution to safety by building on teamwork between the cabin and flight deck crews, during both normal and emergency operations. CRM teaches crewmembers to utilize effectively all resources available to the crew (e.g. hardware, software and other individuals) to achieve a safe flight.

The commercial airliner has long been divided into two cultural and geographical environments: the flight deck and the cabin.

My predecessors were “skygirls” who had to be registered nurses, single, childless females under the age of 25, and under the weight of 115 pounds. They were hired to quell the nervousness of new fliers on those long, arduous journeys that sometimes took between 18 and 24 hours to complete, in an airplane that was not pressurized, heated or air-conditioned. We were onboard the aircraft for practical reasons but marketing played a large role also. Compliance and sociability in the 1930s were important attributes in skygirls. Pilots by contrast evolved from the 1920s stunt pilots and aerialists. These “barnstormers” performed almost any trick or feat with an airplane that people could imagine. They also took the role of ensuring that the coast-to-coast air mail flights of the 1920s were successful.

These differing cultural differences, one dedicated to public service and trained to be marketing driven and the other dedicated to the operation of machinery and proficient in technical matters, have been imbued by tradition and airline management and are still somewhat present today.

In addition to the cultural barriers between cabin and flight deck, there is also the physical barrier that has been there for years, the flight deck door. The flight attendants can be even further divided themselves by the class in the cabin they are working, either first class, business or coach. In a sense, there may be two or more teams in the cabin; with the pilots behind the flight deck door the potential for a fragmented onboard crew is high.

Besides the physical partitions, another layer that separates the onboard team is the administrative rostering or scheduling of the pilots versus the flight attendants, as these rotations might not follow the same pattern. This is especially true if the duty and rest regulations for the pilots and flight attendants differ. For example, cabin and flight deck crews could fly together for a series of flights, then head in different directions. In the U.S., some of our pilot and flight attendants don't even stay in the same hotel, which is another factor that separates the two teams.

September 11 Security Measures Added

After September 11, 2001 the U.S. and other countries responded to the aviation threat that aircraft could be used as weapons. Aviation security needed to be revised and strengthened to meet the newest threats. In the area of airport security the screening of passengers and belongings needed to be improved; identification and validation of persons having access to secured areas of the airport and to aircraft needed to be updated and strengthened; and more effective security measures need to be included in any future airport construction, just to name a few.

Inside the aircraft, training was redesigned to address the new threat and incorporate a new philosophy in the way a crew was to respond to a terrorist attack. In terms of physical infrastructure, new reinforced flight deck doors were also mandated. There have always been doors that could be used to separate the flight deck and cabin crews, but the reinforced door is a much more substantial barrier than the old door. The reinforced doors are designed to stop, or at least delay, forced intrusions and to resist ballistic

penetrations and small cabin explosions. These doors have hardened locks that in many cases can only be opened using an entry code. No longer can flight attendants use a key to enter the flight deck. Those keys have been destroyed with the intent to keep terrorists out; unfortunately, flight attendants are also kept out. Furthermore, in addition to being a physical barrier, the locked door is also a psychological barrier that discourages an open stream of communication.

The locked door also forces flight attendants to handle more issues and make more decisions on their own. No longer does an additional flight deck crew member come out of the flight deck and assist in the cabin. Even with the emergence of the two-pilot crew, one of the pilots would typically come into the cabin to help handle a situation if they felt it necessary. That is, prior to September 11.

Operational changes restricting access to the flight deck during flight were also required to strengthen security. The basic philosophy is the flight deck, and its pilot occupants, need to be protected at all times, by prohibiting unknown individuals from gaining entry to the flight deck. That means limiting the number of times crew enter or exit the flight deck, with the entry and exit process done as quickly as possible. And before even opening the door, the flight attendant needs to ensure there is a clear zone in the cabin sections adjacent to the door.

Prior to this operational change due to security the flight attendants may have gone up to the flight deck several times to give a status report on a situation in the cabin or to let them know about something odd happening in the cabin even though it was not a concern yet. Or they could simply have gone up there to talk during a slow cabin service period. Such informal bonding has been a significant part of CRM; unfortunately, the new operational changes now discourage such activities, creating another psychological barrier.

Our method of communication with the pilots after September 11 is now limited to the interphone system. Entering the flight deck to have a face-to-face conversation with the

pilots to tell them about a possible problem passenger is no longer an acceptable practice, given that the problem passenger could be a ruse to get the flight attendant to open the flight deck door.

Our direct interaction with pilots is now reduced to merely fulfilling specific requests such as delivering food and drinks, and minimal contact when they need to exit and re-enter the flight deck for bathroom breaks. And that interaction is usually only performed by the flight attendant stationed closest to the door. On a given long haul flight, we may only see the pilots twice, when delivering meals or picking them up. On short haul flights the communication may be even more limited, because of the need to maintain sterile cockpits and the fact that flight attendants are not necessarily delivering any meals up front.

Communicating with the interphone can sometimes be problematic due to static on the line making understanding difficult. In situations like this, face-to-face conversation could help alleviate any mis-communication. In discussing interphone communications with flight attendant safety representatives, I was told about a very interesting situation at one airline. At this carrier the pilots have requested that the flight attendants not use the interphone on one particular aircraft type and model, because when the interphone rings in the flight deck it is very loud and startles them. In spite of this request, about half the flight attendants call them anyway because it is SOP (standard operating procedure) at their carrier to use the interphone for all communications. Those flight attendants are of the mind set that it is just “too bad, so sad, deal with the noise.” However, we have also been told that other flight attendants do comply with the pilot request to not use the interphone system, so much so that they actually refrain from calling the flight deck even when there may be an issue in the cabin.

All these factors are affecting the relationship between the flight attendants and the pilots and can affect the overall performance of the crew as a team. The front-end crew / back-end crew mentality is returning, further undermining the benefits of CRM.

Is There a Solution?

CRM training has been conceived to prevent aviation accidents by improving crew performance through better interpersonal skills, leadership style, communication, crew coordination, planning, briefing, workload management, decision making, error management, risk identification and management techniques.

In the past at my airline, part of our new hire training for flight attendants included a ride in the flight deck during take-off and landing to familiarize them with the work environment and to get a better understanding and awareness of the pilots' duties. This extremely effective CRM tool for developing situational awareness was unfortunately stopped with the restriction of access to the flight deck following the events of September 11. While I have had the benefit of this experience, our newer flight attendants have not had the opportunity to experience an observation ride in the flight deck.

While it may no longer be possible to conduct the observation flight deck rides for new hires, there are other things that can be done to begin reversing this adverse trend in communications training. Pilots and flight attendants have different cultures and often react to situations in very different ways, so good communication between the groups is vital.

In the U.S., flight attendant classroom training hours have been reduced to the bare minimum required by regulations. U.S. regulations require annual training on dealing with emergency situations, the use and function of emergency equipment onboard the aircraft, security and CRM, just to name a few of the subjects. Unfortunately, the trend has been to squeeze all this safety and security information into as little time in the classroom as possible.

Similar to some of the European carriers like Air New Zealand and Swiss Air International, some of the smaller U.S. carriers AFA-CWA represents provide 2 days of recurrent training. The U.S. carriers may only operate one aircraft type with the same

cabin configuration and emergency equipment. One has to wonder what subjects are being short-changed in the one-day recurrent training that the larger carriers are providing. Certain subjects like emergency equipment must be covered by regulations, so if you only have an 8-hour day for training, and multiple subjects to cover, some of those subjects, for example security training and CRM concepts, are routinely getting merged with other subjects. They may no longer be standalone subjects, which is legally permissible since subjects like CRM have no specific minimum required training hours. A common example is rolling CRM time management and communication skills into emergency response training. The guidance materials for CRM training say that time management must ensure that pilots or flight attendants can effectively "brief" other crewmembers and passengers in a limited time. This CRM concept is now incorporated into our emergency response training – we are trained to ask the pilots for information relative to the nature or type of emergency, the time we have to prepare the cabin, and if there are any special instructions for dealing with the emergency. The U.S. carriers can now "tick the box" that they have completed the regulatory requirement for CRM training.

While quantity of hours spent in training do not necessarily guarantee quality, the setting of a minimum number of hours for subjects like CRM training would help to prevent rolling the subject in with other training subjects. Effective CRM cannot be learned from a book or a lecture or a video or a supervisor. People can only learn to communicate effectively with each other by practicing the art of communicating with each other. And there is more to the CRM concept than just getting type, time and special instructions from the pilots.

Joint CRM Training

Both the U.S. regulations and the JAR Ops require training in CRM, but neither require mandatory training involving both pilots and flight attendants, even though safety often depends on precise and accurate communication between the two groups.

There are a handful of international airlines and a very limited number of US carriers providing joint pilot and flight attendant CRM training. However, the majority of airlines do not provide this training. The reasons often cited include difficulty in scheduling of the two types of crews and the economic costs involved.

Joint CRM training is an important and effective tool for improving crew coordination, and should therefore be implemented at all airlines as one means of ensuring maximum levels of safety throughout the aviation system. And while frequent, at least annual training is desirable, the reality is that biennial or even triennial training can be effective if done properly.

AREAS FOR IMPROVEMENT

Many of the above mentioned changes and improvements have helped increase the overall survivability in emergency situations. Many of them were long overdue and took many years to be implemented and in our opinion may not have gone far enough. But we recognize that in the end they are at least a small step forward to improving survivability. We would now like to focus on a number of areas where steps are still needed to increase the odds of survivability and reducing risks for serious injuries.

Training

Flight attendants in order to remain qualified must receive training at certain times during their career. Flight attendant training is composed of several required types of training. They are indoctrination, initial, transition, differences, emergency, recurrent and requalification training. These trainings combine to form the training program. The training program is approved by the FAA and can be changed upon approval by the FAA.

New hires will go through indoctrination, initial and emergency training. There are some time requirements associated with these new-hire types of training. For current flight attendants to remain qualified they must attend an annual recurrent training. The regulations specify this must be done every 12 months and again there are some hours

specified. Each carrier that operates commercial airplanes must have an FAA approved training program that covers all the subjects, hours and time intervals for their training.

All part 121 operators are following the same training regulations. Yet each carrier can have very different training programs, again, which must be approved by the FAA. While the regulations set forth the minimum number of programmed hours for certain trainings the regulations themselves also allow a reduction of these programmed hours. The carrier has the ability to ask their FAA inspector to approve their reduction in training hours. And after completing an approval process with the FAA these reduced hours now become part of the air carrier's training program.

The AFA-CWA over the years has expressed concern over the apparent extreme differences in the levels of training that our members receive. As an example all operators are required to provide recurrent training to each active flight attendant every 12 months. This training should ensure that each crewmember is adequately trained and currently proficient on each type of aircraft on which the flight attendant is to serve. The regulations stipulate that all required subjects and topics in initial and emergency training be covered in recurrent training. Recurrent training should include updated information on equipment, operational practices and procedures, information from accidents and incidents, and on areas that require special emphasis.

Some of the regional airline operators are providing a two-day recurrent training for their flight attendants. This is likely an operator that has one or two aircraft types, with similar configurations of the cabin, similar locations for emergency equipment and similar procedures for emergency evacuation. A major operator, in contrast, that has multiple aircraft types, in multiple aircraft configurations will conduct a one day recurrent training. Part of recurrent training is knowledge on the operating procedures of each door in the fleet in both the normal mode and emergency mode. So the more aircraft types a carrier operates the more aircraft door opening/closing procedures a flight attendant would need to know about. The door is just one example of how unrealistic it is that a major operator is able to get all the required subjects into a one-day recurrent training

while the smaller regional operator is finding it necessary to have a two-day recurrent training. One of these groups might be getting a better overall training.

Some have argued that this reduction to recurrent training is allowed because of the increased amount of material that is being presented in homestudy or computer-based training modules. This training can be as simple as filling in blanks in a notebook, watching a video or a similar activity. The FAA does allow homestudy to substitute for a percentage of the programmed training hours. While we recognize the potential that this type of "distance education" may hold for enhancing future training, we do not believe the industry is currently at a stage where this "fill in the blank" on a piece of paper or "hit the enter key to progress to the next video slide" is at a level that operators should be using it as a replacement for traditional classroom studies. Distance learning is also only relevant to knowledge and cognitive skill learning objectives. Creditability of distance learning is more complicated in regard to psychomotor skills and performance.

Distance education or computer-based training should not be a substitute for hands-on realistic training. In many industries you hear the saying, "practice makes perfect." Aviation is no different, especially when you are dealing with an emergency situation. Current training requirements for flight attendants stipulate that at one time during their career they must perform a PBE (protective breathing equipment) drill and a firefighting drill. This drill could include locating the source of the fire or smoke, coordinating and communicating to other crewmembers the situation, choosing the appropriate fire extinguisher and getting the PBE, donning the PBE, moving passengers away from the fire, fight the fire until it is extinguished and continue to update fellow crewmembers as appropriate. Realism is an extremely important part of dealing with emergency situations. Even though this is a one-time required drill the FAA does not require that it be conducted with an actual fire. The regulations allow use of a simulated fire or smoke.

At a recent safety conference that I attended, attendees were asked what their training requirements were, if any, for flight attendants conducting the fire extinguisher training and whether the training required an actual fire. The conference attendees represented

various countries with different regulatory training requirements. Needless to say the U.S. and Australia were the only two countries of the five in the room at the time that did not require a live fire fighting drill for their flight attendants. Both allowed the use of simulated fires. Japan and Jamaica conduct live fire drills yearly. Canada requires new hire flight attendants to combat a live fire and every 36 months thereafter. Each trainee is required to demonstrate the correct use of a fire extinguisher applied to an actual fire while wearing a PBE.

It is imperative that training for equipment and emergencies be done in an environment or setting relevant to the specific equipment conditions. A disadvantage to using a simulated fire is that the urgency and stress of the situation may not realized due to the lack of realism. This realism can also help the flight attendant to be more confident in her/his approach to an emergency situation.

AFA-CWA was a vocal advocate on improving the flight attendant training standards. The Cabin Safety Training Working Group, under the FAA Aviation Rulemaking Advisory Committee (ARAC) subcommittee on Air Carrier Training and Qualifications began meeting in the early 1990s to address possible changes to training standards. Although old documents show that some of the training issues discussed were radiation and its effects on cabin crew members, crew resource management (CRM), and fire training, the only issue that the working group could reach consensus on was the single regulatory issue that there should be an English language standard for flight attendants. An ANPRM was published in the Federal Register on April 18, 1994. In February of 1996 the FAA announced the formation of another ARAC to dispose of the 1994 ANPRM comments. Midstream of the ARAC process the FAA withdrew the ANPRM stating that any possible rulemaking on the subject would be incorporated into the overall context of a crew training rulemaking project that was then being developed internally at the FAA.

In 2004, this internal FAA rulemaking project was eventually shared with some of the industry through the creation of an Aviation Rulemaking Committee (ARC). The ARC

focused on changes to improve flight safety issues; the application of simulation to flight crewmember training, testing, or checking activities; and the implementation of technical changes in training and qualification standards. The AFA-CWA participated in this ARC.

The NPRM on Qualification, Service, and Use of Crewmembers and Aircraft Dispatchers was published in the Federal Register on Monday, January 12, 2009. The document is quite lengthy at 175 pages. AFA-CWA has yet to review the document in its entirety but we are hopeful that it will address some of our past training concerns. On a review of the document a couple items did stand out. The proposed training regulations would require hands-on training on some emergency equipment every 12 months versus the current 24 months requirement for hands-on training. Flight attendant ground school instructors will now be required to receive specific training and qualifications as instructors. And of course, the English language requirement is included.

In summary, current flight attendant training can and must be improved. Hands-on training is crucial and these flight attendants from Flight 1549, a more senior crew, have had years of hands-on practice which we believe is crucial for the necessary skill sets. If the airlines can spend a great deal of time and money training flight attendants how to use credit card swiping devices, surely they can commit the time and resources necessary for vital, hands-on safety training. We are hopeful that working through the new NPRM on flight attendant training we can keep a focus on the need for hands-on, realistic training.

Fatigue

Fatigue experienced by front-line aviation workers is a long-standing concern of investigations into commercial aviation accidents and incidents. These concerns have led to significant research into fatigue experienced by flight deck crew, and, to a lesser extent, maintenance and air traffic control workers. No one questions that pilot and mechanic fatigue is a serious concern, but I am here to tell you that flight attendant fatigue is also a very real and serious concern that poses a potentially dangerous risk to aviation safety.

Multiple studies have shown that reaction time and performance diminishes with extreme fatigue – an unacceptable situation for safety and security sensitive employees. Flight attendants are required to be on board to assist in case an aircraft emergency evacuation is necessary. In addition, they are inflight first responders who are trained to handle smoke and fire incidents, and medical emergencies including CPR and emergency births. Furthermore, since the terrorist attacks of September 11, 2001 flight attendants have assumed increased responsibilities for protecting the safety and security of air travelers during flight. It has become even more important for flight attendants to be constantly vigilant of the situation in the aircraft cabin, notice and monitor unusual passenger behavior, and be aware of their surroundings at all times. Given these increased responsibilities, an inability to function due to fatigue could seriously jeopardize the health, safety and security of the traveling public and other crewmembers.

We have received reports from flight attendants admitting that due to fatigue they had forgotten to arm their evacuation slides, or due to fatigue had forgotten they had unaccompanied minors onboard and allowed them to leave the aircraft by themselves. There are examples of flight attendants falling asleep or nearly falling asleep on their jumpseats during landing. The same jumpseats that are located next to the emergency exit doors which would need to be used in the event of an emergency evacuation.

We also have examples from flight attendants that have said they are too fatigued to drive home, or operate their car, for fear of getting into an accident. We even have reports of members being stopped by law enforcement when driving due to the fact that police believed they were driving under the influence of alcohol because of their erratic driving. Just prior to that they would have, by the FAA's account, been okay to operate the emergency equipment onboard an aircraft in a fatigued fashion. However, as a fatigued driver on the road they are a hazard to others.

All these safety mishaps can have devastating ramifications. Fortunately they have not.

In the last few years the aviation industry has finally begun to study flight attendant fatigue. I want to review some recent and planned flight attendant fatigue studies, as well as some of the operational issues as they relate to flight attendant roles and responsibilities. I will start first with an internal study that my organization did in 2005 so that we could begin to further highlight the problem. But first you need to understand the U.S. regulations that govern the flight attendant's duty and rest requirements.

In the U.S., as in some other countries, the flight deck and flight attendants operate under two different duty time regulations. The flight attendants can be made to work longer hours and have a different working pattern. While some countries may afford the cabin crew the ability to not continue flying because of fatigue, this is not the case for all countries. In the U.S. we have some operators that allow pilots to be released from their scheduled duty due to fatigue, but a flight attendant is not afforded the same relief without a possible disciplinary action by the operator. Many of the same issues that contribute to pilot fatigue contribute to flight attendant fatigue. Like pilots the timing of work hours, time zone shifts, and any subsequent impact of off-duty sleep quality also contribute to flight attendant fatigue. Another similar area of concern is the length of a continuous wakeful period. However flight attendants are even more susceptible in this area because, unlike pilots, we do not have a regulatory hard limit on actual flying time in a 24 hour period.

The minimum rest requirement for pilots and flight attendants in the U.S. is also similar. According to the U.S. Federal Aviation Regulations (FARs), pilots and flight attendants flying under 14 CFR Part 121 must have a minimum rest period of at least nine hours following any scheduled duty period. Flight attendants can be scheduled up to 14 hours of duty. The nine-hour period can be reduced to as little as eight hours, if the employer schedules a 10-hour rest period following the next duty period. I'd like to make a further clarification at this point. Using the term "rest period" can be misleading because much more must be done during this period of time other than simply sleeping. The "rest period" can begin as soon as fifteen minutes after an aircraft pulls into the gate and continues until one hour prior to their next departure. This "rest period" must also

include travel through an airport, waiting time for a shuttle to the layover hotel, travel to the hotel, checking-in, possibly finding time to eat a meal since many of our carriers in an effort to cut costs have removed flight attendant crew meals from the flights, getting prepared for bed, getting dressed in the morning, getting breakfast and prepared for work the next morning, travel back to the airport and last, but certainly not least is sleep time.

As the deep concessions demanded of flight attendants during the recent and ongoing financial turmoil of the airline industry have taken hold it has become clear that airline management hopes to keep our members working longer duty days with greatly reduced time off between duty. The airline industry practice has been to schedule as little as nine hours of rest for flight attendants. They have also been using the reduced rest provision. It is our understanding that the reduced rest period provision was originally meant to accommodate "day of" scheduling when carriers encounter delays out of the carriers' control such as bad weather or air traffic control delays. The FAA has also discounted flight attendant fatigue. The FAA has chosen to ignore the routine implementation of this provision by airline management and the further erosion of meaningful rest periods for flight attendants. To further highlight the FAA's turning of a blind eye to this practice, an FAA spokesperson, in response to a question from the media on this issue stated, "The FAA rules on flight time and rest for both pilots and flight attendants are fundamentally sound. They serve aviation safety very well." We fundamentally disagree.

To investigate our concerns the AFA-CWA conducted a fatigue study in early August to early September 2005. Two of the objectives of the study were to characterize the flight attendant duty and rest periods and also catalog flight attendant perceptions of their work. Fifty members from 10 airlines participated in the survey. It was a month-long survey that recorded their activities on a daily trip log. We analyzed 58 trips which typically ran 3-4 days duration each. There are some assumptions relative to the data collected on the 58 trips. All trips begin and end at an airport. Each scheduled and actual duty day is a consecutive block of time with no gaps. Meal breaks at an airport or inflight do not subtract from the duty time. Another assumption was that the scheduled rest runs from the end of one duty day to the start of the next duty day.

The average trip length for the 58 trips evaluated was 52.7 hours. This resulted in scheduled duty time that was about 44 percent of scheduled total trip time which meant that scheduled rest was about 56 percent of scheduled total trip time. However, of the 56 percent of the trip that was scheduled rest time, only 52 percent resulted in actual reported sleep, with preparations before and after sleep, ground travel, eating and miscellaneous non-sleep activities consuming the other 48 percent. Thus, one could reasonably argue that an 8 hour scheduled rest period may result in a flight attendant getting only slightly more than 4 hours of actual sleep. If further evidence confirms this result, we contend that the regulatory policy governing safety sensitive employees that allows 8 hours scheduled rest periods is unacceptable.

Not only was AFA-CWA concerned with flight attendant fatigue but so was the U.S. Congress. The Omnibus Appropriations for FY '05 contained an appropriation for $200,000 directing the FAA to conduct a study of flight attendant fatigue. The FAA was to report back to Congress by June 1, 2005 with their findings.

The FAA delayed release of the report for over one year, even though the study itself was completed. The FAA repeatedly ignored requests from AFA-CWA and members of Congress to release the report and explain the delay in reviewing the study by the Administrator's office. Finally, after AFA-CWA staged an all night "sleep-in" by flight attendants in front of the FAA headquarters in order to draw attention to the issue, the FAA released the report.

In order to complete the required study, representatives of the FAA from the Civil Aerospace Medical Institute (CAMI) initiated an agreement with NASA Ames Research Center to perform an evaluation of the flight attendant fatigue issue. Due to the short internal deadline for conducting the report, the researchers were unable to conduct a thorough and comprehensive study of flight attendant fatigue. It primarily consisted of a review of existing literature on the issue, an evaluation of flight attendant duty schedules and a comparison of those schedules to the current regulations regarding rest. Based just

on this limited research, the report concluded that flight attendants are "experiencing fatigue and tiredness and as such, [it] is a salient issue warranting further evaluation." They also stated that "not all the information needed could be acquired to gain a complete understanding of the phenomenon/problem of flight attendant fatigue."

The report listed a number of recommendations for further study. They were:

1) A scientifically based, randomly selected **survey of flight attendants** as they work. Such a study would assess the frequency with which fatigue is experienced, the situations in which it appears, and the consequences that follow.
2) A **focused study of aviation incident reports** in order to determine what role fatigue played in already reported safety incidents.
3) The need for **field research on the effects of fatigue**. This research would explore the impact that rest schedules, circadian factors and sleep loss have on flight attendants' ability to perform their duties.
4) The determination and **validation of fatigue models** for assessing how fatigued a flight attendant will become. Developing a reliable fatigue modeling system would be an important tool for the aviation industry in helping to determine when rest periods should be scheduled.
5) A **study of International policies and practices** to see how other countries address these issues.
6) **Development of training material** to reduce the level of fatigue that may be experienced by flight crews and to avoid factors that may increase fatigue levels.

The second, more comprehensive study based on the recommendations from the 2005 study is now being conducted by the FAA. Two of the main components required to be conducted are; 1) the survey of field operations, and 2) the field study. The Survey of Field Operations is the larger of the two projects. The survey will solicit input from approximately 22,000 U.S. flight attendants. The survey looks at: general demographics; flight operations; sleeping at home; duty days (including scheduling practices); fatigue (including perceptions of fatigue, fatigue factors, and fatigue effects); and work

environment (including corporate attitudes, safety, training, and management quality). The collection of these surveys is currently ongoing and will end March 31, 2009.

The Field Study is a smaller sampling group. It will include approximately 200 flight attendants. They will be asked to report and monitor their duty periods, sleep and activities over the course of a single month of flying using personal digital assistants (PDAs), wrist activity monitors and pedometers. Data collection for the field study will begin prior to a trip, continue throughout the trip, and for a few days after returning home to assess recovery. The field study will begin in a couple months.

The issue of flight attendant fatigue is also more relevant now with the advent of aircraft being able to fly longer distances. Airlines are expanding their operations to include longer flight segments, some of which can have block times exceeding 16 hours. These Ultra Long Range (ULR) Operations require careful study to determine appropriate fatigue mitigation strategies for all crew members, including flight attendants.

We believe that the issues of operational requirements, training, crew staffing levels and duty cycles must be considered if flight attendants are to participate in ULR operations. The regulatory authorities must first establish firm regulatory rest requirements for ULR operations, with no allowance provided for discretionary reductions of these requirements by the operator or their personnel.

Recently the FAA began to address the issue of ULR operations and create standards that would help combat fatigue for both pilots and flight attendants. The FAA, recognizing that a flight of 16 hours in duration or longer was not addressed in the U.S. regulations, reached agreement with one operator on an operations specification that regulates many of the duty and rest concerns specific to their ULR operation. Around the same time, two other U.S. airlines began considering their own ULR operations. The FAA, to ensure a level playing field, began a process that led to a template operations specification for the industry. Initially the FAA presented the two U.S. airlines seeking to start ULR

operations with the proposed document. The FAA later allowed other aviation industry stakeholders the ability to review and comment on the document.

Although the FAA followed a relatively transparent process in developing the ULR operations specification, and in spite of the overwhelming evidence generated over the years regarding fatigue, the ULR operations specification has not been accepted by the majority of U.S. airlines that may conduct such operations. In fact, seven U.S. airline operators are now suing the Federal Aviation Administration for implementing the ULR operations specifications. The lawsuit states that the new ULR operations specification apply new regulatory requirements to operators that will impose substantial burdens and costs on operators. The lawsuit also contends that the ULR operations specification constitutes a rule of general applicability and under U.S. law a public notice and comment period was required, and that by not following the rulemaking process, stakeholders with expertise on the underlying safety issues were not given the opportunity to participate in the public comment process.

Nineteen U.S. airlines, through their trade and service organization the Air Transport Association of America, Inc. (ATA), filed comments opposing the current and ongoing FAA flight attendant fatigue survey of field operations and the field study that was referenced earlier in this paper. Their opposition to the fatigue research for flight attendants was based on three considerations: 1) the proposed survey will not add practical information to existing knowledge, 2) extensive information already exists on fatigue in aviation and 3) the Federal Register notice does not adequately describe the FAA proposal.

One of the items that was missing from the FAA ULR Operations Specifications template was a mandatory requirement for bunk facilities for flight attendants. As a flight attendant this was an unacceptable and unsafe option. An onboard crew bunk attempts to replicate an environment that is conducive to sleep, that is one that is comfortable, dark and quiet. Design of such environments should also consider the ventilation, temperature/humidity control as well as the necessary communication systems and

emergency equipment needs. Previous studies on pilot sleep in onboard bunks have been conducted. Past study conclusions have stated that in-flight sleep in a crew bunk is inferior to sleep an individual gets in their home environment or at their layover location. Other studies have concluded that rest in a bunk, even with its limitations, is superior to rest in a passenger seat in the cabin of the aircraft.

The U.S. National Transportation Safety Board (NTSB) itself has recognized the danger posed by fatigue in the transportation industry and has recommended setting working hour limits for transportation operators based on fatigue research, circadian rhythms, and sleep and rest requirements. In fact human fatigue has been on the NTSB's "Most Wanted" list since 1990. So this discussion is nothing new in that sense. The one problem with the NTSB recommendation is that it does not include the need to address flight attendant fatigue.

I believe that it is abundantly clear that flight attendant fatigue is real, it is a problem and that it is growing. Some may argue, and indeed have argued, that an error caused by flight attendant fatigue is not as serious as an error caused by pilot fatigue or maintenance fatigue because the flight attendant error does not cause the aircraft to crash. These same people would also claim that flight attendant fatigue does not warrant inclusion on the "most wanted" list. This argument is short sighted. An error caused due to flight attendant fatigue can lead to a tragic loss of life in the event of an inflight emergency or during an evacuation.

We know that there have been incidents over the years where flight attendant fatigue was an issue. For example, on July 9, 1995, an ATR72 operated by Simmons Airlines, as American Eagle Flight 4127, experienced the loss of the rear cabin entry door during the takeoff climb. The flight crew was able to circle around and land successfully. The aircraft received minor damage and one flight attendant received minor injuries. The flightdeck crew, the other flight attendant and the 61 passengers reported no injuries.

The probable cause of the incident was the flight attendant inadvertently opening the door inflight due in part to flight attendant fatigue from a lack of sleep and the long duty day. The flight attendant estimated that she had approximately 5 hours of sleep the night before the incident flight. Also, contributing to the incident was a change in the design of the door locking mechanism.

If we add the human factors issue of fatigue - impaired judgment - and then add the human factors design issue - the re-design of the door - we have a perfect human factor interaction error in the Simmons incident. Industry is continually working to build aircraft that alleviate the human factor design issue, so why would we say the human factor issue of fatigue in the cabin isn't a concern? We should work to address the fatigue factor just as well.

Take another example of an emergency. On August 2, 2005, an Air France Airbus A340-313 aircraft overran the end of the runway and came to a rest in a ravine just outside the perimeter of Toronto's Lester B. Pearson International Airport. The flight had 12 crew members and 297 passengers on board.

After the aircraft stopped, flight attendants observed a fire outside the aircraft and ordered an evacuation. The flight attendants facilitated a fast evacuation from the emergency exits while an intensifying fuel-fed fire was engulfing the aircraft. Only four of the eight emergency exits equipped with slides were usable for evacuation, due to one slide failure and fire around the vicinity of the other slides. Amazingly only two crew members and ten passengers were seriously injured. The aircraft fuselage was eventually consumed by fire.

If the flight attendants on Air France Flight 358 had been fatigued the outcome of this evacuation could have been very different. What if they had pulled the quick release handle on one of the remaining four useable slides instead of the inflation handle? If that had happened, the crew would have then been down to only three exits for the

evacuation. This could have very likely happened as we know that flight attendants make mistakes due to fatigue as we saw in the Simmons incident

Fortunately, flight attendant mistakes are often not as obvious because of the current extraordinarily low number of accidents. But the potential for a serious incident is there.

To ensure safety of the entire transportation industry as a whole we must look at all workers that could have an affect on the survival rate of passengers, not just the pilot who operates the aircraft or the maintenance personnel who fix broken equipment. We are, after all, operating the equipment that fights fires, provides medical first response, and helps with a safe and speedy evacuation. To say that flight attendant fatigue should not be a concern, or is not as important because we are not the sole factor that could cause an accident, or that we don't operate a moving vehicle, is to perpetuate an unspoken assumption that saving passenger lives doesn't matter.

Flight attendant fatigue must be addressed. I offer the following suggestions to help create a better understanding of flight attendant specific fatigue and some fatigue management strategies.

1) Flight attendant fatigue data needs to be collected from actual operating environments. While some international airlines have been conducting studies with their flight attendants the U.S. airlines have been inexcusably resistant to data collection of this type.
2) There needs to be a crew reporting mechanism with associated feedback. This reporting procedure must first allow a flight attendant to "call in fatigued" similar to a pilot without discipline (non-punitive approach to safety).
3) There must be a process for investigating fatigue reports or incidents and implementing corrections or new procedures that might solve or reduce the recurrence of the problem.

4) Management must support scheduling practices, operational practices, rest environments and attendance policies that support reducing fatigue in their operations.
5) Education and awareness training programs should be conducted for all employees (crewmembers, schedulers, dispatchers, etc.) having a responsibility for ensuring an airline operation that does not promote fatigue.
6) For ultra-long range operations on-board rest facilities should be required.

While there is a place for science to assist it should be in addition to and complement mandatory maximum duty and minimum rest requirements. As you have seen in my testimony, some airlines have been less than supportive of true fatigue mitigation strategies. It would be a shame if airlines could use science to inappropriately ensure their operational needs were totally satisfied to the detriment of fatigue management. It is therefore important to realize that while the industry appears to be heading to a less prescriptive approach to fatigue management there is still a place for traditional regulations that limit the number of hours worked versus the new thoughts of "comprehensive plans" that help identify fatigue and mitigate risks.

We can all agree that it is possible that a flight attendant error, due to fatigue, could possibly result in the death or serious injury to some of our passengers. Therefore, it is crucial that we be just as concerned with flight attendant fatigue as pilot and mechanic fatigue if we hope to achieve the aviation goal of preventing accidents and saving lives.

Fatigue is not an issue that can be mitigated through simple education. It must be addressed through regulations and adequate rest periods should not be subjected to the collective bargaining process.

Development of a Method for Assessing Evacuation Capability of Aircraft Under Actual Emergency Conditions

Design standards are used in the design phase of a project, and can be verified while the product, in this case, an airplane, "is still on the drawing board." i.e., before the airplane is built. Performance standards evaluate the performance of the product, often under the influence of factors that cannot be effectively integrated or evaluated during the design. Typically, a performance standard involves a test of the product after it is built. In the case of a full scale evacuation demonstration (a performance standard) of an airplane, the factors that must be evaluated are the performance of the passengers and crew.

The FAA made a change in policy that would allow new airplane designs or any increase in an existing design's capacity to be approved using analysis of data from past tests, rather than conducting a full scale test of the model requiring certification. But there is currently no analytical method that is capable of predicting failure of the crew and passengers to meet the performance standard after the design standard has been met. There have been such failures in the past. Since there are no analytical methods that can properly substitute for the full scale demonstration, the FAA cannot enforce their policy.

The requirement for full-scale emergency evacuation demonstrations was introduced by FAA NPRM 63-42 (28 FR 11507, October 23, 1963). This notice justified this proposal by stating: "Recently, the Agency observed several simulated passenger emergency evacuation demonstrations which were conducted by various air carriers using different types of airplanes. The time required to accomplish each of these demonstrations varied from 131 to 213 seconds using 178 to 189 persons. In all instances, it was evident that a more realistic assignment of functions within the cabin would have resulted in lesser time to evacuate the airplane satisfactorily. From these demonstrations, it has been concluded that a physical demonstration of an air carrier's ability to execute its established emergency evacuation procedures within a specific time period is necessary in the interest of safety and to insure a more realistic assignment of functions which, in turn, will result in satisfactory accomplishment of emergency evacuation procedures."

Clearly, the original intent of the evacuation demonstration was to show the satisfactory accomplishment of emergency evacuation ***procedures***. The final rule reinforced this intent (30 FR 3200, March 9, 1965).

The following year, FAA Notice 66-26 (31 FR 10275, July 29, 1966) proposed to establish comparable requirements for the airplane manufacturers. This notice stated that "…traditionally, it has been considered sufficient to provide the necessary components for emergency evacuation through detailed quantitative requirements prescribed in the airworthiness rules. However, experience has shown that compliance with these requirements does not ensure that the airplane can be evacuated, during an emergency, within an acceptable time interval. Differences in the relationships between elements of the emergency evacuation system introduce a considerable variation in evacuation time, and this variation is expected to be even more marked on larger transport aircraft under development." Thus it was acknowledged that relationships between the various elements of the evacuation system, not just the elements themselves, had a critical influence on evacuation time. In other words, the whole was considerably more complicated than the sum of its parts. Since the manufacturer would be demonstrating the basic capability of a new airplane type without regard to crewmember training, operating procedures and similar items (such demonstration of procedures was still required under Part 121, the operational requirements), this new demonstration was not expected to validate the evacuation procedures of the air carriers or operators. FAA Notice 66-26 also proposed that once a manufacturer had successfully conducted an evacuation demonstration for a particular airplane type, the passenger seating capacity could be increased by no more than five percent if the manufacturer could substantiate, by analysis, that all the passengers could be evacuated within the prescribed time limit. This appears to be the first proposal to suggest the use of "analysis" in lieu of full-scale evacuation testing. However, this analysis was intended to provide comparison with the full scale evacuation actually conducted on the airplane. These proposals were adopted as a final rule (32 FR 13255, September 20, 1967).

The tests conducted by operators to show satisfactory accomplishment of emergency evacuation procedures and by manufacturers to show that the aircraft interior configuration and the relationship between the elements of its emergency evacuation system could be evacuated within a specified time period were allowed to be satisfied under a single test under Amendment 25-46 (43 FR 50578, October 30, 1978). Under this amendment, the FAA also stated that "A combination of analysis and tests may be used to show that the airplane is capable of being evacuated within 90 seconds under the conditions specified in 25.803(c) of this section if the Administrator finds that the combination of analysis and tests will provide data with respect to the emergency evacuation capability of the aircraft equivalent to that which would be obtained by actual demonstration." The FAA recognized the problems with this new provision and in its discussion of it concluded that: "Several commentators objected to the proposed amendment to 25.803(d) which would allow analysis in showing that the airplane is capable of being evacuated within 90 seconds. One commentator stated that analysis alone is an incomplete means of showing compliance and should not be allowed. Another commentator stated that extrapolations based on analytical testing have no practical relation to actual conditions which occur in accidents and evacuation demonstrations. The FAA agrees that the limitations on the use of analytical procedures should be made clear. The requirement that the Administrator find the analysis data acceptable was intended to *preclude approvals which might be based on insufficient test data, such as in the case of a completely new model or a model which has major changes or a considerably larger passenger capacity than a previously approved model"* (Italics ours.)

This intent was reinforced by the FAA Administrator in a 1986 Regulatory Interpretation and FAA Advisory Circular (AC) 25.803.1, Emergency Evacuation Demonstrations, issued November 13, 1989.

In 1985 testimony before the U.S. House of Representatives Subcommittee on Investigations and Oversight of this Committee (formerly named Public Works and Transportation Committee) and its Chairman, James Oberstar, the FAA Administrator

suggested that a reassessment of regulations pertaining to emergency evacuation of transport airplanes was warranted. Consequently, an Emergency Evacuation Task Force, open to the public, for that purpose was established in September, 1985. The continued use of full scale emergency evacuation demonstrations was one of the matters considered by that task force. One of the presentations, by Boeing, suggested that a rudimentary analytical procedure be used in lieu of full scale demonstrations. Basically, the manufacturers favored analysis, while the representatives of people who flew on the airplanes, either as crewmembers or passengers, opposed analysis. The task force was unable to reach consensus on when to accept analysis in lieu of a demonstration. A similar process was undertaken by an advisory committee to the FAA in the 1990s with the same failure to reach consensus.

The procedures used by the flight attendants in a full scale emergency evacuation certification demonstration are intended to become the baseline procedures for the aircraft type and model tested. This was the reason for the promulgation of the 1965 rule requiring operators to conduct full scale emergency evacuation demonstrations. These procedures are found in the Flight Standardization Board Report for each type and model of aircraft. Yet some demonstrations conducted since 1996 have utilized a procedure that makes it easier for the manufacturer to pass the test, but it is not a procedure that is used by U.S. scheduled operators. The intent of the regulation requiring full scale evacuation demonstrations is not being carried out by the FAA.

The analytical method does little more than calculate that, if the design standards are met, the aircraft could be evacuated within the requirements of the performance standard. Since the design requirements were intended to provide an airplane capable of being evacuated within the requirements of the performance standard, use of the analytical method is redundant.

Analysis is not a method that can predict failure of an emergency evacuation system, unlike a full scale demonstration utilizing appropriate evacuation procedures.

The result of the FAA's policy and of the currently inadequate "state of the art" analytical methods accepted under the policy, is that the first full scale evacuation of a new airplane will be performed by the traveling public under emergency conditions rather than by paid test subjects under the controlled test conditions of a demonstration. There is no assurance that the evacuation would be successful. For this reason, the FAA should be required to rescind its policy of allowing the use of analysis in lieu of the full scale demonstration until a scientifically valid method is developed.

The time is past due for development of a method for assessing the evacuation capability of aircraft under real emergency conditions. An independent blue ribbon panel needs to be established within the National Academy of Sciences (NAS) to examine these problems in depth and design a study to develop such a method, if not develop the method itself.

Contaminated Aircraft Air

The issue of poor aircraft cabin air quality and in many cases the contamination of the air supply by potentially toxic chemicals continues to pose a threat to those that work onboard the aircraft as well as those that travel onboard the aircraft. AFA-CWA believes that in some instances contaminated air could lead to a fatal incident or decrease survivability in some situations. At the heart of the failure of the US Federal Aviation Administration (FAA), the manufacturers, and the airlines to *resolve* problems with aircraft air quality is their failure to *acknowledge* problems with aircraft air quality. There are no standards for protective measures or access to information necessary to prove individuals' cases; there is effectively no government oversight, allowing the steady flow of "anecdotal" reports to be dismissed as unreliable, and therefore irrelevant.

It is no small task to describe and document problems with air quality on aircraft; hence, the length of this submission. The problems are varied, but the lack of oversight and protective measures is common to all and is in desperate need of remedy. Here, seven

problems with aircraft air quality are described in detail. The highlights are described here:

Inadequate ventilation: In buildings, owners must meet minimum ventilation standards intended to protect occupant health and comfort. On aircraft, there is no ventilation standard, despite the fact that aircraft are the most densely occupied of any environment. In buildings, workers can request an OSHA investigation of indoor air quality. On aircraft, there is no government body assigned to investigate related illness reports. Further, there are no protections in place for flight attendants assigned to fly to areas affected by Severe Acute Respiratory Syndrome (SARS), even though crewmembers do not have the option of "postponing non-essential travel." The World Health Organization recognizes flight attendants as potential "close contacts"; the Centers for Disease Control and Prevention does not.

Polluted air supply on the ground. Exhaust fumes and heated deicing fluids can be ingested into the air supply systems, especially during ground operations.

Exposure to heated oils and hydraulic fluids. Heated oils and hydraulic fluids can leak or spill into the air supply systems during any phase of flight, potentially exposing passengers and crew to carbon monoxide and neurotoxins, such as tricresylphosphates. There are almost no protective measures in place to prevent air supply contamination, and contaminated aircraft can be – and are - dispatched as "airworthy." Chronic or even permanent neurological damage can result, although affected passengers and crew have little recourse without any record of air monitoring or access to maintenance records. Pilot incapacitation is an additional risk. The FAA has shown no signs that it plans to follow the recent National Research Council committee recommendation for requisite carbon monoxide monitoring on all flights.

Reduced oxygen in the ambient air during flight. During flight, the aircraft cabin is maintained at a reduced pressure, generally equivalent to an altitude of 6,000 –

8,000 feet, although sometimes higher. At an effective altitude of 8,000 feet, the supply of oxygen is reduced by 25% relative to sea level. There is evidence that the current "8000 feet standard", first issued in 1957, is based not on health, but on operating costs, and that the reduced oxygen supply may be inappropriately low for a substantial portion of the flying public.

Inadequate attention to the thermal environment. Providing air nozzles ("gaspers") at each occupant seat and work area allows flight attendants and passengers to adjust the temperature of their environment. This is especially important in areas where flight attendants are physically active. In addition, flight attendants regularly report that the galleys and jumpseats located near the aircraft doors can be uncomfortably cold at ankle level, presumably because the doors are poorly insulated. A standard that defines a target temperature range and maximum vertical and horizontal temperature differentials would address this problem. Door heaters have already proven an effective and practical remedy.

Exposure to ozone gas: Symptoms associated with ozone exposure are well documented and include respiratory distress and increased susceptibility to infection. Ozone levels increase with altitude and latitude, and are highest in the late winter and early spring. The exposure limit for ozone cited in the Federal Aviation Regulations is 2.5 times higher than the workplace limit set by the National Institute for Occupational Safety & Health. Airlines are under no obligation to monitor or record ozone levels in the cabin.

Exposure to potentially high concentrations of pesticides: Some countries require that incoming aircraft are sprayed with pesticides to kill any insects that may be on board and may carry disease. The pesticides are applied in occupied or soon-to-be-occupied aircraft cabin without any measures to inform or protect the health of passengers or crew. Reported symptoms range from sinus problems and rash to anaphylactic shock and nerve damage. Differences in exposure levels and individual susceptibilities are described. The

US Department of Transportation's investigation into the feasibility and efficacy of non-chemical methods to keep aircraft cabins insect free must be actively supported.

It is imperative that the members of this Committee keep the FAA focused on addressing this serious issue and supporting vital research that will help clarify and solve this ongoing problem. It is also important that the Committee assist in preventing airline management from stonewalling efforts to conduct vital studies of and efforts to address aircraft cabin air quality.

Cost Benefit Analysis

Finally, I'd like to discuss concerns with Cost-Benefit Analysis. An October 2001 report entitled High Hopes and Low Standards! The Life and Times of Airline Travel in Canada, by Andrew Reddick of the Public Interest Advocacy Centre, considered some of the issues related to use of the cost-benefit approach for regulating aviation safety. The following comments, borrowed from Mr. Reddick's report, offer a useful, thought-provoking perspective on Cost-Benefit Analysis:

> "Part of the problem in dealing with the safety issue and airline travel is the conceptual framework that the industry and to a degree, government, has adopted for safety. ... [T]hese differences are exemplified in how safety is dealt [with] through the choices in the industry between the 'precautionary principle' or the 'risk approach' (also referred to as risk analysis or cost benefit analysis).
>
> "In a precautionary approach, standards are created, and investments and initiatives are undertaken to prevent, or greatly reduce the potential for, a possible occurrence, and to provide resources to appropriately deal with an occurrence. In a risk approach, it is calculated that the likelihood of an event occurring is minimal or a low probability. As such, it is then considered more financially effective and efficient to not pursue certain undertakings. In this

framework, when an incident does occur, the cost will still be less than that of the proactive precautionary approach, up to a certain level. For example, through actuarial calculation, for some airlines it is less expensive to pay out claims in the case of injury or death to a certain financial level than to carry insurance or make equipment upgrades. This is of little solace to those passengers falling into the wrong statistical grouping when the 'risk' approach is used. As noted by Lyn Romano, head of the International Air Safety Association, the cost benefit analysis taken by airlines and regulators means it is 'cheaper to pay out big settlements than prevent an aviation disaster in the first place…This is a reactive, Tombstone Mentality approach, rather than a proactive approach…Too many of the safety issues have been known for years, but swept under the carpets.'

Beyond the obvious ethical questions about the value of life as opposed to money and equipment, from a strict methodological view point, this approach raises serious questions about whether a broad enough set of criteria are used to undertake cost-benefit-risk analyses which truly reflect the concerns, interests and circumstances of all parties, e.g., airlines, airports, passengers and their families."

AFA believes that the recent accident in Buffalo highlights the differences in perspective between the NTSB, which appears to favor the precautionary principle, and the FAA, which appears to favor cost-benefit analysis. This tragic accident gives the aviation industry an opportunity to revisit these differing approaches to regulating safety, and hopefully helps bring us back toward the precautionary principle, and away from cost-benefit.

In conclusion, we have been fortunate to see an overall decrease in commercial airline accident rates over the last few years. As I testified, improvements have been made. Many of those design improvements were required because of fatal accidents and developed almost two decades ago. As we've seen with the crew of Flight 1549, survival has become the norm, more so than the recent tragic accident in Buffalo. But we can not

rest on our laurels. We cannot stop researching new design standards that could further improve the accident survival rate. In addition, we must continue to evaluate and improve current operational procedures that would further enhance the ability of all crewmembers to fulfill their duties as safety professionals. AFA-CWA will continue to remain at the forefront of advocating for the safest aviation system in the world.